



Evaluation of flow duration curves with assigned return period in heterogeneous basins of Southern Italy

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Flow duration curves are used in many hydrological applications from river ecology and environmental flow management to water supply assessment and hydropower generation design. The flow duration curve (FDC) is defined as the relationship between any given discharge value and the percentage of time that this discharge is exceeded and, depending on the application purpose, they may be constructed using different time steps and resolutions, from instantaneous maximum or minimum daily flow to annual, monthly, weekly or, more frequently, daily streamflows. A bounded FDC model, called “EtaBeta”, is used which provides a probabilistic framework for the evaluation of the FDC with an assigned return period, and accounts for the variability of the FDC by means of distributions of annual minimum daily discharge and total annual streamflow. The intra-annual variability is described by the Complementary Beta distribution, with two parameters (a , b) whose behaviour characterizes the shape of the distribution and in particular of its tails. The model has been applied to a number of catchments in Southern Italy. Results show that the inter-annual variability of the annual FDC, and hence its return time, are well represented by the minimum annual flow and the total annual streamflow while the shape parameters (a , b) control the intra-annual variability. A regional analysis has been performed in order to investigate the relationships between model parameters and some characteristic basin indices aiming to the extension of the FDCs evaluation method to ungauged basins.